IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A plasma processing method for forming a fluorine-containing carbon film on a surface of a substrate by using a plasma processing apparatus including a processing chamber in which a mounting table is provided; a disc-shaped planar antenna member disposed at an upper portion of the processing chamber to face the mounting table, a plurality of slots for radiating a microwave being circumferentially formed in the planar antenna member; a dielectric plate disposed under the planar antenna member, the dielectric plate transmitting the microwave radiated from the planar antenna member; and a conductive gas supply member disposed between the dielectric plate and the mounting table to divide the inside of the processing chamber into an upper plasma generation space and a lower processing space, the gas supply member having a plurality of through-holes and a plurality of gas supply openings, the plasma generation space and the processing space communicating with each other through the through-holes, wherein the method comprises the steps of:

(a) mounting the substrate on the mounting table in the processing chamber;

(b) forming a fluorine-containing carbon film of a predetermined thickness on the surface of the substrate on the mounting table, including: (b1) supplying a rare gas into the plasma generation space, (b2) supplying a film forming gas, which is a compound gas containing carbon and fluorine, into the processing space through the gas supply openings of the gas supply member, and (b3) activating the rare gas and the film forming gas by radiating the microwave from the planar antenna member to deposit active species generated from the film forming gas;

(c) unloading the substrate on which the film is formed out of the processing chamber;

(d) after the step (c), by supplying a cleaning gas containing oxygen and hydrogen into the processing chamber and radiating the microwave from the planar antenna member to activate the cleaning gas, cleaning inner surfaces of the processing chamber including a bottom surface of the dielectric plate with oxygen active species and hydrogen active species generated from the cleaning gas; and

(e) after the step (d), by supplying the film forming gas into the processing chamber and radiating the microwave from the planar antenna member to activate the film forming gas, forming a precoat film of fluorine-containing carbon on the inner surfaces of the processing chamber including the bottom surface of the dielectric plate with active species generated from the film forming gas,

wherein the steps (d) and (e) are performed under the condition that a dummy substrate is mounted on the mounting table in the processing chamber.

Claim 2 (Canceled).

Claim 3 (Original): The plasma processing method of claim 1, wherein the gas supply member is made of aluminum or an aluminum alloy.

Claim 4 (Previously Presented): The plasma processing method of claim 3, further comprising:

between the steps (d) and (e), the step of (d1), by supplying a gaseous mixture of an oxygen-containing gas and a rare gas into the processing chamber and radiating the microwave from the planar antenna member to activate the gaseous mixture, oxidizing the surface of the gas supply member with oxygen radicals generated from the gaseous mixture.

Claim 5 (Currently Amended): A plasma processing method for forming a fluorine-containing carbon film on a surface of a substrate by using a plasma processing apparatus including a processing chamber in which a mounting table is provided; a disc-shaped planar antenna member disposed at an upper portion of the processing chamber to face the mounting table, a plurality of slots for radiating a microwave being circumferentially formed in the planar antenna member; a dielectric plate disposed under the planar antenna member, the dielectric plate transmitting the microwave radiated from the planar antenna member; and a conductive gas supply member disposed between the dielectric plate and the mounting table to divide the inside of the processing chamber into an upper plasma generation space and a lower processing space, the gas supply member made of aluminum or an aluminum alloy and having a plurality of through-holes and a plurality of gas supply openings, the plasma generation space and the processing space communicating with each other through the through-holes, wherein the method comprises the steps of:

(a) mounting the substrate on the mounting table in the processing chamber;

(b) forming a fluorine-containing carbon film of a predetermined thickness on the surface of the substrate on the mounting table, including: (b1) supplying a rare gas into the plasma generation space, (b2) supplying a film forming gas, which is a compound gas containing carbon and fluorine, into the processing space through the gas supply openings of the gas supply member, and (b3) activating the rare gas and the film forming gas by radiating the microwave from the planar antenna member to deposit active species generated from the film forming gas;

(c) unloading the substrate on which the film is formed out of the processing chamber;

(d) after the step (c), by supplying a cleaning gas containing oxygen and hydrogen into the processing chamber and radiating the microwave from the planar antenna member to

activate the cleaning gas, cleaning inner surfaces of the processing chamber including a bottom surface of the dielectric plate with oxygen active species and hydrogen active species generated from the cleaning gas; and

(e) after the step (d), by supplying a gaseous mixture of an oxygen-containing gas and a rare gas into the processing chamber and radiating the microwave from the planar antenna member to activate the gaseous mixture, oxidizing the surface of the gas supply member with oxygen radicals generated from the gaseous mixture, wherein an oxide film having a high adhesivity is formed on the surface of the gas supply member by the oxidizing step (e).

Claim 6 (Original): The plasma processing method of claim 5, wherein the step (d) is performed under the condition that a dummy substrate is mounted on the mounting table in the processing chamber.

Claim 7 (Withdrawn): A plasma processing apparatus for forming a fluorine-containing carbon film on a surface of a substrate by using a film forming gas which is a compound gas containing carbon and fluorine, the plasma processing apparatus comprising:

a processing chamber in which a mounting table is provided;

a transfer mechanism for transferring the substrate between the inside and the outside of the processing chamber;

a disc-shaped planar antenna member disposed at an upper portion of the processing chamber to face the mounting table, a plurality of slots for radiating a microwave being circumferentially formed in the planar antenna member;

a dielectric plate disposed under the planar antenna member, the dielectric plate transmitting the microwave radiated from the planar antenna member;

a conductive gas supply member disposed between the dielectric plate and the mounting table to divide the inside of the processing chamber into an upper plasma generation space and a lower processing space, the gas supply member having a plurality of through-holes and a plurality of gas supply openings, the plasma generation space and the processing space communicating with each other through the through-holes;

a gas supply line for supplying a cleaning gas containing oxygen into the processing chamber; and

a controller for executing a control of repeating at least two times the following steps of (a) to (e):

(a) mounting the substrate on the mounting table in the processing chamber;

(b) forming a fluorine-containing carbon film of a predetermined thickness on the surface of the substrate on the mounting table, which includes: (b1) supplying a rare gas into the plasma generation space, (b2) supplying a film forming gas, which is a compound gas containing carbon and fluorine, into the processing space through the gas supply openings of the gas supply member, and (b3) activating the rare gas and the film forming gas by radiating the microwave from the planar antenna member to deposit active species generated from the film forming gas;

(c) unloading the substrate on which the film is formed out of the processing chamber;

(d) after the step (c), by supplying a cleaning gas containing oxygen into the processing chamber and radiating the microwave from the planar antenna member to activate the cleaning gas, cleaning inner surfaces of the processing chamber including a bottom surface of the dielectric plate with oxygen active species generated from the cleaning gas; and

(e) after the step (d), by supplying the film forming gas into the processing chamber and radiating the microwave from the planar antenna member to activate the film forming

gas, forming a precoat film of fluorine-containing carbon thinner than the fluorine-containing carbon film formed in the step (b) on the inner surfaces of the processing chamber including the bottom surface of the dielectric plate with active species generated from the film forming gas.

Claim 8 (Previously Presented): The plasma processing method of claim 1, further comprising the step of:

(f) repeating the steps of (a), (b), (c), (d) and (e) in that order.

Claim 9 (Previously Presented): The plasma processing method of claim 5, further comprising the step of:

(f) repeating the steps of (a), (b), (c), (d) and (e) in that order.

Claim 10 (Previously Presented): The plasma processing method of claim 4, further comprising the step of:

(f) repeating the steps of (a), (b), (c), (d), (d1) and (e) in that order.

Claim 11 (New): The plasma processing method of claim 5, further comprising the step of:

(f) after the step (e), by supplying the film forming gas into the processing chamber and radiating the microwave from the planar antenna member to activate the film forming gas, forming a precoat film of fluorine-containing carbon on the inner surfaces of the processing chamber including the bottom surface of the dielectric plate with active species generated from the film forming gas.

Claim 12 (New): The plasma processing method of claim 11, further comprising the step of:

(g) repeating the steps (a) to (f) in that order.

Claim 13 (New): The plasma processing method of claim 8, wherein the thickness of the precoat film formed by the step (e) before repetition is substantially identical to a thickness of the precoat film formed by the step (e) after repetition.

Claim 14 (New): The plasma processing method of claim 10, wherein the thickness of the precoat film formed by the step (e) before repetition is substantially identical to a thickness of the precoat film formed by the step (e) after repetition.

Claim 15 (New): The plasma processing method of claim 12, wherein the thickness of the precoat film formed by the step (e) before repetition is substantially identical to a thickness of the precoat film formed by the step (e) after repetition.